THE EFFECT OF MOSQUITO LARVAE UPON DRINKING WATER

BY

RUBERT BOYCE, F.R.S., AND F. C. LEWIS

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In all yellow fever countries, it is well known that the presence of *Stegomyia* larvae in any collection of water is a source of danger, so much so, that in very many British Colonies penalties are now enforced against stagnant water, and the presence of mosquito larvae is deemed evidence of this.

If the water cannot be thrown away, then it must be securely protected by netting from Mosquitos, or it must be oiled or stocked with larvae-destroying fish.

It so happens that the larvae of the *Stegomyia* are most commonly found in clean water, the *Stegomyia calopus* selecting clean water to deposit her eggs in. Clean water is of course the water usually found in and around all houses, being required for domestic use, for drinking and cooking purposes, baths, flowers and for any domestic pets or animals kept on the premises. It, therefore, is not to be wondered at that in the yellow fever zone the presence of larvae is taken as evidence that the water is clean. But their presence is only evidence that the clean water was in all probability the only available water near to or in the house found by the *Stegomyia* in which to deposit her eggs. From the fact that *Stegomyia* larvae were usually met with in clean water, they became in time to be regarded in a beneficial light—to possess in fact a clarifying influence upon water. They were regarded as scavengers, taking into their interiors any bacteria or other minute organisms which might be present. The normal food of mosquito-larvae consists of minute forms of vegetable matter, and therefore they no doubt do consume bacteria. Hence it was argued that their presence in water barrels supplied from the roofs of houses would be distinctly useful, for it was urged that they might consume pathogenic bacteria derived from the dust of the roofs or from the droppings of birds of the carrion-feeding kind. This belief considerably influenced some authorities against rigorously protecting their water supplies from mosquitos, and it was therefore with the object of testing whether there was any foundation for this belief and with the further object of studying the effect of minute forms of animal life on drinking water—such forms, for example, as are found in large numbers in the filter beds and reservoirs of the water supplies of cities—that I undertook with my Assistant, Mr. Frederick C. Lewis, the following series of simple experiments:—

The experiments consisted in placing larvae of *Culex* spp. and of *Theobaldia annulata* in a flask of non-sterilised drinking water, and comparing from day to day the number of bacteria present in the water with the number present in a control flask to which no larvae had been added. The two flasks which I call 'A' and 'B' were freely exposed to the air. The number of bacteria was estimated by plating 1 c.c. of the water in gelatine and incubating at 21° C. for 72 hours.

The results were as follows:—

SERIES I

Date	FLASK 'A,' without larvae	FLASK 'B,' with larvae	Date
	Bacteria per 1 c.c.	Bacteria per 1 c.c.	
4.12.09	880	873	4.12.09
5.12.09	983	1,935	5.12.09
6.12.09	1,350	2.720	6.12.09
7.12.09	1.420	2,590	7.12.09
8.12.09	765	3,597	8.12.09
9.12.09	980	5,390	9.12.09
10.12.09	87	—	10.12.09
11.12.09	15	—	11.12.09
12.12.09	35	9,370	12.12.09

SERIES II

Date	FLASK 'A,' without larvae	FLASK 'B,' with larvae	Date
	Bacteria per c.c.	Bacteria per c.c.	
28.1.10	25	1,250	29.1.10
30.1.10	109	8,600	30.1.10
31.1.10	599	51,200	31.1.10
1.2.10	3,090	67,000	1.2.10
		137,000	3.2.10

Series III

Date	Flask 'A,' without larvae	Flask 'B,' with larvae	Date
	Bacteria per c.c.	Bacteria per c.c.	
5.2.10	27	56	5.2.10
7.2.10	193	149,000	7.2.10
8.2.10	1,760	168,000	8.2.10
9.2.10	3,920	...	9.2.10

Series IV

Date	Flask 'A,' water to which typhoid bacilli were added, but no larvae	Flask 'B,' same water with larvae added	Date
	No. of *B. typhosus* present per c.c.	No. of *B. typhosus* present per c.c.	
5.12.09	12	13	5.12.09
6.12.09	16	Large increase of *B. typhosus* and other bacteria	6.12.09
7.12.09	6	,, ,,	7.12.09
8.12.09	3	50	8.12.09
9.12.09	—	7	9.12.09
11.12.09	—	6	11.12.09
12.12.09	—	0	12.12.09

Series V.—To ascertain the effect on drinking water of the Water Cyclops.

Date	Flask 'A,' without Cyclops	Flask 'B,' with Cyclops	Date
	Bacteria per c.c.	Bacteria per c.c.	
28.1.10	25	1,060	28.1.10
30.1.10	109	1,460	29.1.10
31.1.10	599	14,200	30.1.10
1.2.10	3,090	48,600	31.1.10
		69,000	1.2.10
		173,000	3.2.10

Result:

From these experiments, it will be seen that in clean drinking water drawn from the tap and exposed to the air, there is a slight multiplication of the number of bacteria for a few days, and that then the bacteria rapidly decrease, in all probability owing to the want of food material.